

In the Claims

1-10 (canceled)

11 (currently amended). A method of producing probes intended for labeling human chromosomes comprising mixing first amplification products and second amplification products obtained by two IRS-PCR amplifications from said chromosomes and labeling said amplification products with one or more fluorophore, wherein said first amplification products are obtained using PCR primers specific for the Alu and LINE DNA sequences and said, ~~said~~ second amplification products are obtained using PCR primers specific for the ~~for~~ Alu DNA sequences and said amplification products are labeled with:

(a) the fluorophore Cy3 having a maximum absorption wavelength of 554 nm and a maximum emission wavelength of 568 nm combined with an excitation filter of the 546DF10 type (Omega Optical) and with an emission filter of the 570DF10 type (Omega Optical);

(b) the fluorophore TR having a maximum absorption wavelength of 593 nm and a maximum emission wavelength of 613 nm combined with an excitation filter of the 590DF10 type (Omega Optical) and with an emission filter of the 615DF10 type (Omega Optical); and

(c) least one fluorophore, absorption filter, and emission filter are selected from the group consisting of:

(i) the fluorophore FITC having a maximum absorption wavelength of 494 nm and a maximum emission wavelength of 517 nm is coupled with the excitation filter of the 490DF30 type (Omega Optical) and with an emission filter of the 530DF30 type (Omega Optical);

(ii) the fluorophore Cy5 having a maximum absorption wavelength of 652 nm and a maximum emissions wavelength of 670 nm combined

- with an excitation filter of the 650DF20 type (Omega Optical) and  
with an emission filter of the 670DF10 type (Omega Optical);
- (iii) the fluorophore Cy7 having a maximum absorption wavelength of  
743 nm and a maximum emissions wavelength of 767 nm combined  
with an excitation filter of the 740DF25 type (Omega Optical) and  
with an emission filter of the 780EFLP type (Omega Optical);
- (iv) the fluorophore Cy5.5 having a maximum absorption wavelength of  
675 nm and a maximum emission wavelength of 694 nm combined  
with an excitation filter of the 680DF20 type (Omega Optical) and  
with an emission filter of the 700EFLP type (Omega Optical); and
- (v) the fluorophore Bodipy 630/650 having a maximum absorption  
wavelength of 632 nm and a maximum emission wavelength of 658  
nm used with an excitation filter of the 630DF20 type (Omega  
Optical) and with an emission filter of the 650EFLP type (Omega  
Optical).

12-26 (canceled).

27 (currently amended). A method of identifying human chromosomes comprising performing a multicolor FISH analysis using a plurality of probes and hybridizing one or more human chromosomes with said plurality of probes, said plurality of probes comprising a set of DNA segments which are more represented in certain chromosome bands and which are obtained by IRS-PCR amplification from said chromosomes with the aid of using primers specific for the for Alu and LINE DNA sequences and said probes are labeled with one or more fluorophore, each of said one or more fluorophore having a specific absorption and emission wavelength, wherein each of said one or more fluorophore is used with a pair of optical filters, one for absorption and one for emission, and wherein said fluorophore and pairs of filters are selected from the group consisting of:

- (a) the fluorophore FITC having a maximum absorption wavelength of 494 nm and a  
maximum emission wavelength of 517 nm used with the excitation filter of the

- 490DF30 type (Omega Optical) and with an emission filter of the 530DF30 type (Omega Optical);
- (b) the fluorophore Cy3 having maximum absorption wavelength of 554 nm and a maximum emission wavelength of 568 nm used with an excitation filter of the 546DF10 type (Omega Optical) and with an emission filter of the 570DF10 type (Omega Optical);
- (c) the fluorophore TR having a maximum absorption wavelength of 593 nm and a maximum emission wavelength of 613 nm used with a excitation filter of the 590DF10 type (Omega Optical) and with an emission filter of the 615DF10 type (Omega Optical);
- (d) the fluorophore Cy5 having a maximum absorption wavelength of 652 nm and a maximum emissions wavelength of 670 nm used with an excitation filter of the 650DF20 type (Omega Optical) and with an emission filter of the 670DF10 type (Omega Optical);
- (e) the fluorophore Cy5.5 having a maximum absorption wavelength of 675 nm and a maximum emission wavelength of 694 nm used with an excitation filter of the 680DF20 type (Omega Optical) and with an emission filter of the 700EFLP type (Omega Optical); and
- (f) the fluorophore Bodipy 630/650 having a maximum absorption wavelength of 632 nm and a maximum emission wavelength of 658 nm used with an excitation filter of the 630DF20 type (Omega Optical) and with an emission filter of the 650EFLP type (Omega Optical).

28 (canceled).

29 (currently amended).      The method of claim 27 ~~claim 28~~, wherein the optical filters exhibit the following qualities:

- they are of the 6-cavity type;
- they have an ADI of 0°;

they have a tolerance  $\lambda_o \pm 20\%$  of FWHM;  
they have a tolerance on FWHM of  $\pm 20\%$  of FWHM;  
they have an OD5 out-of-passband rejection of UV at 1200 nm;  
they have a transmission curve  $T \geq 50\%$  at  $\lambda_o$ .

30 (previously presented). The method of claim 29, wherein the optical filters exhibit, in addition, the following characteristics:

they have a centered useful diameter greater than 21 nm;  
they have a thickness  $\leq 7$  mm.

31 (previously presented). The method of claim 27, wherein said multicolor FISH is a karyotype analysis.

32 (previously presented). The method of claim 31, wherein said karyotype analysis is performed to detect chromosome rearrangements.

33-36 (canceled).

37 (currently amended). A kit comprising at least one fluorophore having a specific absorption and emission wavelength, said kit further comprising at least one pair of optical filters, said pair of optical filters comprising one absorption filter for detecting signals at said absorption wavelength and one emission filter for detecting signals at said emission wavelength, wherein said at least one fluorophore, absorption filter, and emission filter are selected from the group consisting of:

- (a) the fluorophore FITC having a maximum absorption wavelength of 494 nm and a maximum emission wavelength of 517 nm is coupled with the excitation filter of the 490DF30 type (Omega Optical) and with an emission filter of the 530DF30 type (Omega Optical);
- (b) the fluorophore Cy3 having a maximum absorption wavelength of 554 nm and a maximum emission wavelength of 568 nm combined with an excitation filter of the

- 546DF10 type (Omega Optical) and with an emission filter of the 570DF10 type (Omega Optical);
- (c) the fluorophore TR having a maximum absorption wavelength of 593 nm and a maximum emission wavelength of 613 nm combined with an excitation filter of the 590DF10 type (Omega Optical) and with an emission filter of the 615DF10 type (Omega Optical);
  - (d) the fluorophore Cy5 having a maximum absorption wavelength of 652 nm and a maximum emissions wavelength of 670 nm combined with an excitation filter of the 650DF20 type (Omega Optical) and with an emission filter of the 670DF10 type (Omega Optical);
  - ~~(e) the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical);~~
  - ~~(f)~~(e) the fluorophore Cy5.5 having a maximum absorption wavelength of 675 nm and a maximum emission wavelength of 694 nm combined with an excitation filter of the 680DF20 type (Omega Optical) and with an emission filter of the 700EFLP type (Omega Optical); and
  - ~~(g)~~(f) the fluorophore Bodipy 630/650 having a maximum absorption wavelength of 632 nm and a maximum emission wavelength of 658 nm used with an excitation filter of the 630DF20 type (Omega Optical) and with an emission filter of the 650EFLP type (Omega Optical).

38-40 (canceled).

41 (new). The kit according to claim 37, wherein said kit further comprises the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical).

42 (new). The kit according to claim 37, wherein said kit comprises:

- (a) the fluorophore Cy3 having a maximum absorption wavelength of 554 nm and a maximum emission wavelength of 568 nm combined with an excitation filter of the 546DF10 type (Omega Optical) and with an emission filter of the 570DF10 type (Omega Optical);
- (b) the fluorophore TR having a maximum absorption wavelength of 593 nm and a maximum emission wavelength of 613 nm combined with an excitation filter of the 590DF10 type (Omega Optical) and with an emission filter of the 615DF10 type (Omega Optical); and
- (c) least one fluorophore, absorption filter, and emission filter are selected from the group consisting of:
  - (i) the fluorophore FITC having a maximum absorption wavelength of 494 nm and a maximum emission wavelength of 517 nm is coupled with the excitation filter of the 490DF30 type (Omega Optical) and with an emission filter of the 530DF30 type (Omega Optical);
  - (ii) the fluorophore Cy5 having a maximum absorption wavelength of 652 nm and a maximum emissions wavelength of 670 nm combined with an excitation filter of the 650DF20 type (Omega Optical) and with an emission filter of the 670DF10 type (Omega Optical);
  - (iii) the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical);
  - (iv) the fluorophore Cy5.5 having a maximum absorption wavelength of 675 nm and a maximum emission wavelength of 694 nm combined with an excitation filter of the 680DF20 type (Omega Optical) and with an emission filter of the 700EFLP type (Omega Optical);

- (v) the fluorophore Bodipy 630/650 having a maximum absorption wavelength of 632 nm and a maximum emission wavelength of 658 nm used with an excitation filter of the 630DF20 type (Omega Optical) and with an emission filter of the 650EFLP type (Omega Optical).

43 (new). The kit according to claim 37, wherein said kit comprises at least two of said fluorophores and at least two pair of said optical filters.

44 (new). The kit according to claim 37, wherein said kit comprises at least three of said fluorophores and at least three pair of said optical filters.

45 (new). The kit according to claim 37, wherein said kit comprises at least four of said fluorophores and at least four pair of said optical filters.

46 (new). The kit according to claim 37, wherein said kit comprises at least five of said fluorophores and at least five pair of said optical filters.

47 (new). The kit according to claim 43, wherein said kit further comprises the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical).

48 (new). The kit according to claim 44, wherein said kit further comprises the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical).

49 (new). The kit according to claim 45, wherein said kit further comprises the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions

wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical).

50 (new). The kit according to claim 46, wherein said kit further comprises the fluorophore Cy7 having a maximum absorption wavelength of 743 nm and a maximum emissions wavelength of 767 nm combined with an excitation filter of the 740DF25 type (Omega Optical) and with an emission filter of the 780EFLP type (Omega Optical).